

PENNELLA MAKAIRA, NEW SPECIES
(COPEPODA: PENNELLIDAE)
FROM THE ATLANTIC BLUE MARLIN,
MAKAIRA NIGRICANS, IN THE CARIBBEAN SEA

W. E. Hogans

Abstract.—A new species of pennellid copepod, *Pennella makaira*, is described. Collected from the flesh of *Makaira nigricans* off Puerto Rico, *P. makaira* belongs to the group of species in the genus *Pennella* which are less than 50 mm in total length. It differs from its congeners in the size and arrangement of cephalothoracic papillae, and the structure and segmentation of the first and second antennae.

During an examination of the parasitic copepod genus *Pennella* Oken, 1815, in the collection of the United States National Museum of Natural History, three specimens of a previously undescribed species were discovered. This new species, *P. makaira* is described and illustrated herein.

Methods

The cephalothorax of each specimen was cleaned with 20% warm NaOH. After cleaning, one each of the first and second antennae and swimming legs were removed from the cephalothorax of two specimens and cleared in 85% lactic acid to reveal structural details. Figures were drawn with the aid of a camera lucida or drawing tube under phase-contrast microscopy (Photozeiss).

Pennella makaira, new species
Figs. 1-6

Description (based on 3 specimens).—Pennellidae: cephalothorax (Fig. 2a, b) subspherical, with rounded anterior end slightly excavate at center in dorsal view. Surface of anterior end completely covered by papillae (antennary processes). Papillae large, clavate to clublike, branched at margins; becoming smaller and spherical to knoblike at

center. Junction of posterior end of cephalothorax and anterior of neck with 2 lateral horn holdfasts. Holdfast horns cylindrical, unbranched. Neck short, stout, cylindrical, expanded at junction with trunk. Trunk cylindrical, slightly transversely ridged, three-quarters total length, curved slightly ventrally in all specimens. Oviducts on ventral surface at junction of posterior end of trunk and anterior of abdomen. Abdomen dorsoventrally compressed, posterior extremity bifid, rounded. Ventral surface of abdomen covered by 2 rows of plumelike processes; plumes single or secondarily branched (Fig. 3). Egg strings (Fig. 4) incomplete, portions remaining cylindrical, filiform. Eggs uniseriate. Mean total length of specimens 28 mm (27-29 mm). First antennae (Fig. 5) 3-segmented, setose. Basal segment subquadrangular. Second segment cylindrical, with at least 22 setae (some probably missing in all specimens). Terminal segment three-quarters length of second segment, with apical armature of 12 setae; 9 long, flagelliform; 3 short, spini-form. First antennae on dorsal surface of cephalothorax, near anterior margin. Second antennae (Fig. 6) immediately anterior to first, 2 segmented, chelate, with large recurved claw closing on triangular spur on distal margin. Single, stout seta at base of

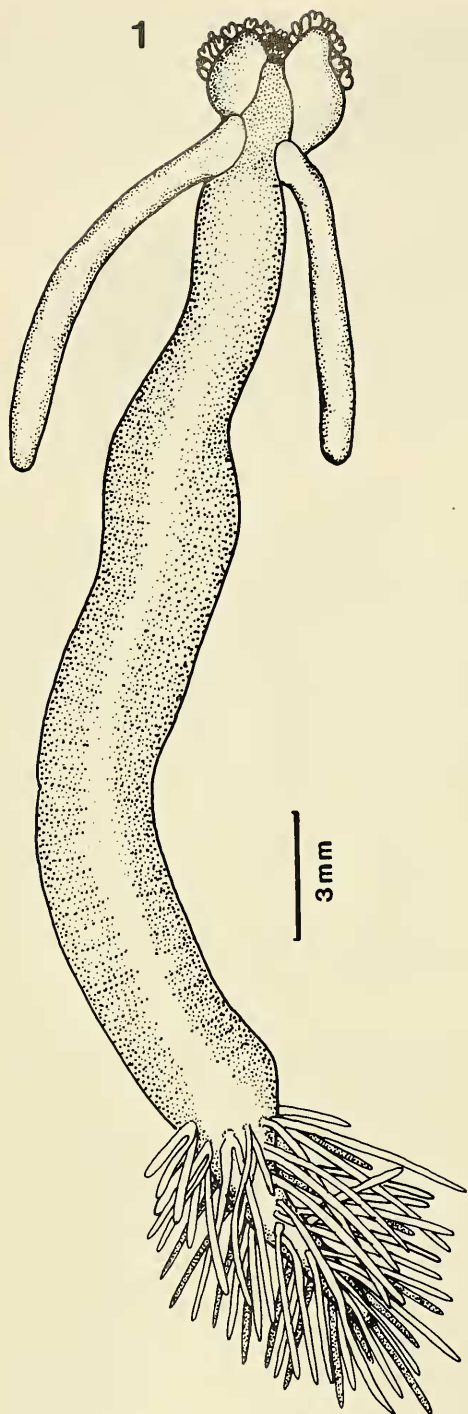


Fig. 1. *Pennella makaira*: trunk, lateral; cephalothorax, dorsal (holotype).

claw. Basal segment subquadrangular. Coxa of second antennae attached to subquadrangular sclerotized plate with single triangular pigment spot. Mouth pennellid, buried between papillae on anterior end of cephalothorax. Maxillae, maxillipeds not discernible. Four pairs of swimming legs on ventral surface close to posterior margin of cephalothorax. First 2 pairs biramous, third and fourth pairs uniramous.

Armament formula as follows:

	Endopod		Exopod	
	1	2	1	2
Leg 1	1-0	7	1-1	5,11
Leg 2	1-0	7	1-1	5,1
Leg 3	—	—	0-0	?,?
Leg 4	—	—	0-0	4,1

Male and pre-metamorphosis female unknown.

Host. — *Makaira nigricans* Lacépède (Atlantic blue marlin).

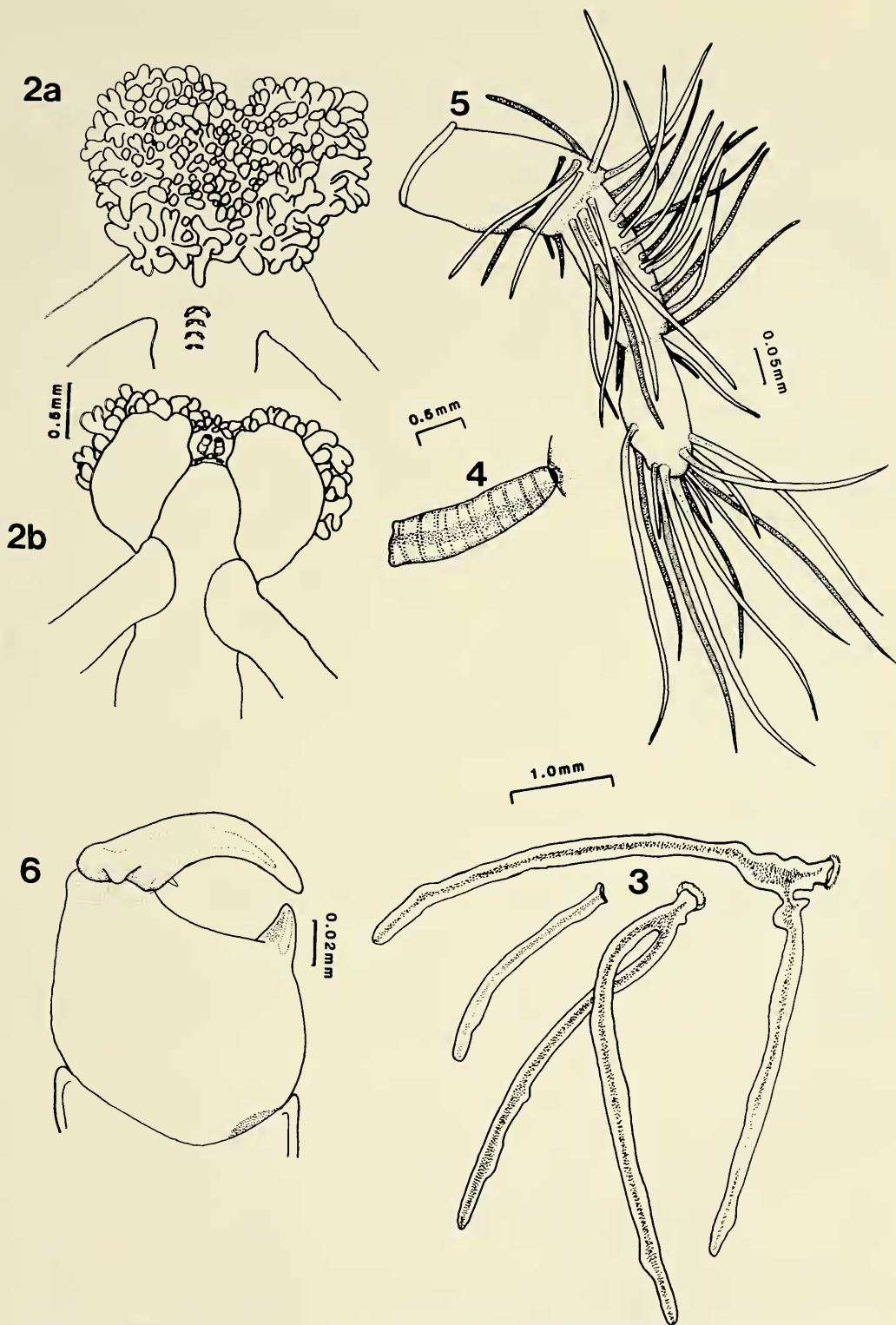
Site of infestation. — Branchiostigal area: cephalothorax, lateral horns and neck of parasite embedded in flesh.

Locality. — San Juan Canyon, Puerto Rico.

Holotype. — USNM 111554.

Paratype. — USNM 222997.

Discussion. — During the examination of more than 200 specimens of *Pennella* in the USNM, three features were found which could be used for separating species of the genus: 1) Overall size of the mature female. Wilson (1917) used total length of the parasite (excluding egg strings) to separate the known species into two groups, those longer than 100 mm and those less than 50 mm. This is, from my examinations, a valid character for general sorting of species; *P. makaira* is in the less-than-50 mm category. 2) The number of segments of the first and second antennae and the structure of the terminal segment of the second antennae is consistent for each species. 3) In small species, the size, shape and arrangement of cephalothoracic papillae is similar among



Figs. 2-6. *Pennella makaira*: 2a, Anterior end of paratype, ventral; 2b, Same, dorsal; 3, Plumules from abdominal brush; 4, Egg string (incomplete); 5, First antenna, dorsal; 6, Terminal segment of second antenna, dorsal.

Table 1.—Comparisons of antennae structure of *Pennella makaira* to similar species in the genus *Pennella*.

Species	First antennae number of segments	Second antennae number of segments
<i>P. biloboa</i>	*	3
<i>P. elegans</i>	*	3
<i>P. exocoeti</i>	4 ^a	2
<i>P. longicauda</i>	5	3
<i>P. makaira</i> n. sp.	3	2
<i>P. platycephalus</i>	*	*
<i>P. robusta</i>	3	3
<i>P. sagitta</i>	3 ^b	2

* No available information.
^a Based on two specimens identified by C. B. Wilson from *Exocoetus volitans* (USNM 112252).
^b Based on one specimen identified by the author from *Histrio histrio* (BMNH 1985, 471).

specimens collected from the same host species or individuals of host species.

Pennella makaira is the smallest species of *Pennella* yet recorded from a scombroid fish. One other slightly larger species from scombrids, *P. biloboa* Kirtisinghe, 1932, was reported from the sailfish, *Istiophorous brevirostris* collected off Sri Lanka. The inadequate description of this species precludes any detailed comparisons. I have been unable to obtain the single type specimen for comparative purposes. From the limited figures in the original description, *P. biloboa* appears to be a slimmer, more delicate parasite than *P. makaira*. Gnanamuthu (1957) described four species of *Pennella* from flyingfishes off the coast of India. None of

the species are adequately described. I have not been able to secure type material for any of these species: *P. elegans*, *P. longicauda*, *P. platycephalus*, and *P. robusta*. They could, judging from the limited figures, be specimens of a single species differing only in age. All four species have total lengths less than *P. makaira*. Two other small species, *P. exocoeti* (Holten, 1802), and *P. sagitta* (Linnaeus) appear to be valid. They have been well described previously and figured and can be distinguished from the new species as follows: *P. exocoeti* is found only on flyingfishes of genus *Exocoetus*. It has a 4-segmented first antenna, whereas the first antenna of *P. makaira* has only three segments. In addition, the distal spur of the terminal segment of the second antenna of *P. exocoeti* is much larger and more sharply pointed than in *P. makaira*. *Pennella sagitta* is found only on the sargassum fish *Histrio histrio*; it is a very delicate parasite with no spherical cephalothoracic papillae. One species which approaches *P. makaira* in total length, *P. diodontis* Oken, Chamisso, & Eysenhardt, 1821, is found, supposedly, only on diodontid porcupine fishes. The validity of the species has been questioned frequently (see Wilson 1917). It has never been adequately described. Although most of the above-listed species are of uncertain validity, a comparison of antenna structure and papillae form for each (compiled from the original descriptions) with those exhibited by *P. makaira* is shown in Tables 1 and 2, respectively.

Table 2.—Comparison of the structure of papillae of the cephalothorax of *Pennella makaira* to similar species in the genus *Pennella*.

Species	Papillae shape	Papillae arrangement	Papillae size
<i>P. biloboa</i>	spherical to clavate, unbranched	partially covering	variable
<i>P. elegans</i>	spherical to clavate, unbranched	partially covering	similar
<i>P. exocoeti</i>	club-like to spherical, unbranched	partially covering	variable
<i>P. longicauda</i>	clavate, unbranched	partially covering	variable
<i>P. makaira</i> n. sp.	tubiform to spherical, bifid irregular branching	completely covering	variable
<i>P. platycephalus</i>	spherical clavate to spherical, branching	partially covering	similar
<i>P. robusta</i>	clavate to spherical, branching	completely covering	variable
<i>P. sagitta</i>	tubiform, irregular branching	completely covering	similar

Acknowledgments

I thank Dr. Roger Cressey for reviewing this paper and for the loan of material used during this study from the Smithsonian Institution, Dr. Paul Illg for collecting the parasites, Dr. Z. Kabata for providing information on the appendage structure in *Pennella*, Dr. M. Deb (ZSI) for searching for the types of Gnanamuthu's specimens, and B. Fullerton for preparing the typescript.

Literature Cited

- Gnanamuthu, C. P. 1957. Lernaeid copepods parasitic on flyingfish. — *Parasitology* 47(1-2):119-125.
- Kirtisinghe, P. 1932. Two new parasitic copepods from Ceylon. — *Parasitology* 24(4):548-551.
- Wilson, C. B. 1917. North American parasitic copepods belonging to the family Lernaeidae, with a revision of the entire family. — *Proceedings of the United States National Museum* 53:1-149.
- Huntsman Marine Laboratory, St. Andrews, New Brunswick E0G 2X0, Canada.